

Cat-to-Human Transmission of Influenza A(H7N2) During an Outbreak Among Cats New York City, 2016

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Assistant Commissioner

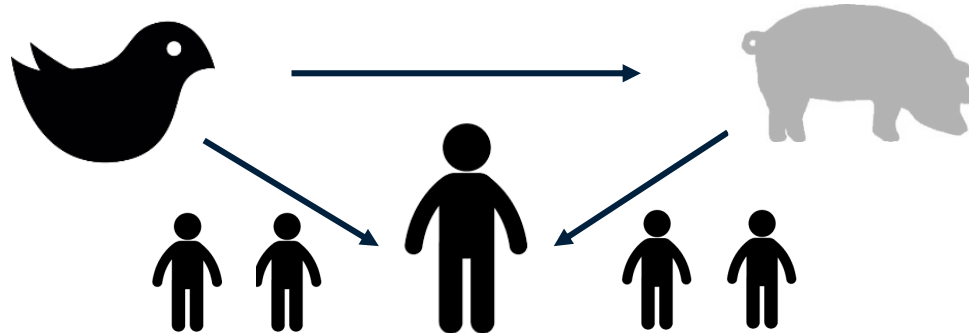
Bureau of Communicable Disease

New York City Department of Health and Mental Hygiene



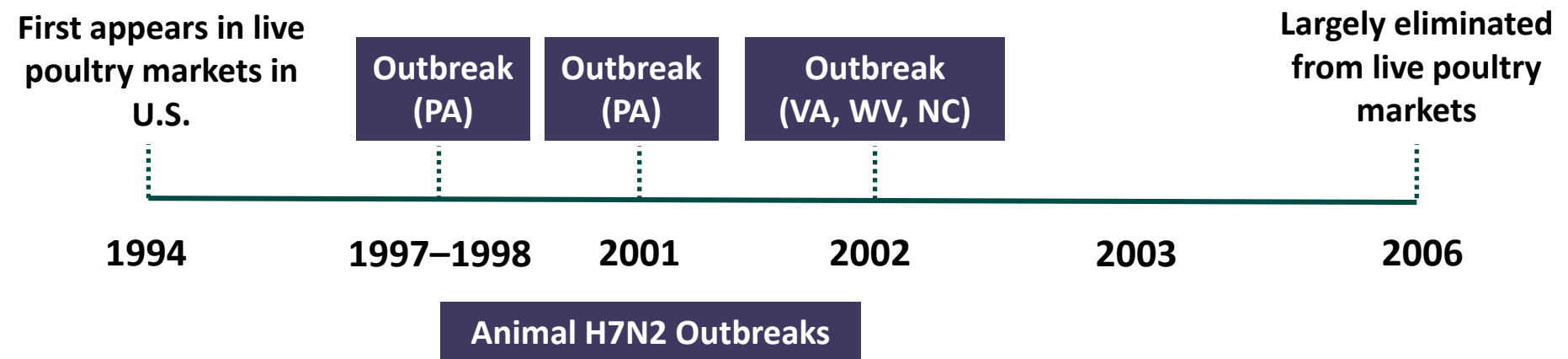
Transmission of Avian Influenza A Viruses Between Animals and People

- Birds are hosts to almost all known subtypes of influenza A viruses
- These viruses can occasionally cross the species barrier
- Pandemics occur when a new virus is introduced to a naïve human population and gains ability for sustained human transmission



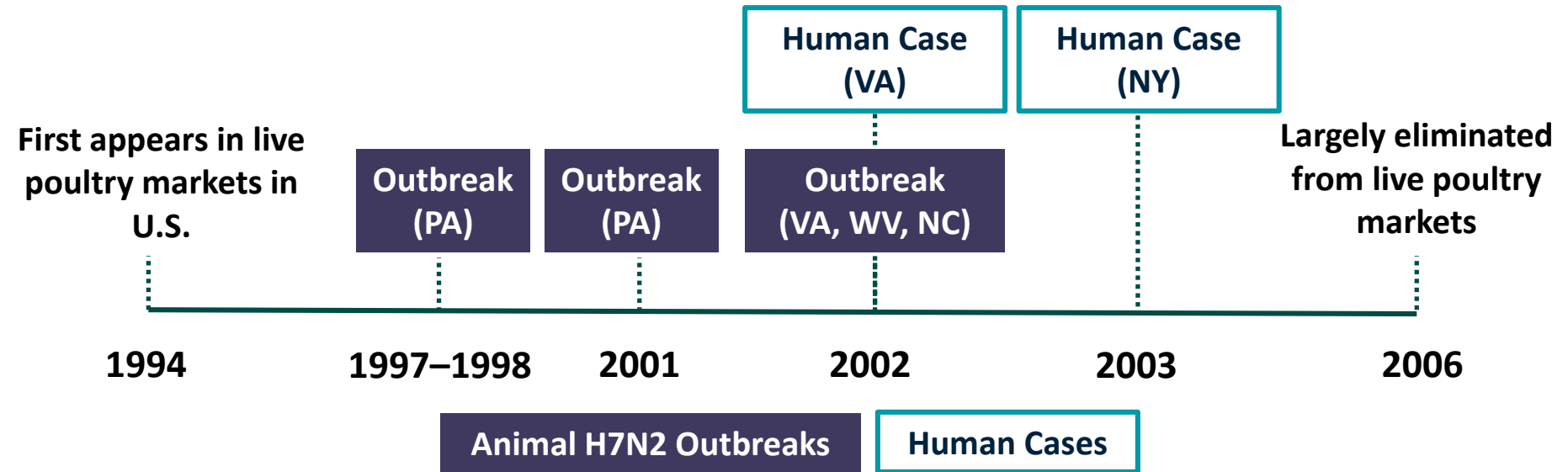
Influenza A(H7N2) Outbreaks in Animals

- Low pathogenic avian influenza virus
- Previously caused large outbreaks in birds in Eastern United States starting in 1994
- Largely eliminated from live poultry markets since 2006



Influenza A(H7N2) Human Infections

- Only two previous human infections in U.S.
- Both recovered fully



The Call — December 14, 2016

- New York City Department of Health and Mental Hygiene (NYC DOHMH) received a report of influenza A(H7N2) in a cat at a NYC Animal Care Centers shelter in Manhattan
 - Entered shelter on November 12
 - Ill with respiratory symptoms and died
 - Canine panel indicated influenza
 - Testing by academic veterinary laboratory indicated influenza A(H7N2), confirmed by USDA National Veterinary Services Laboratory



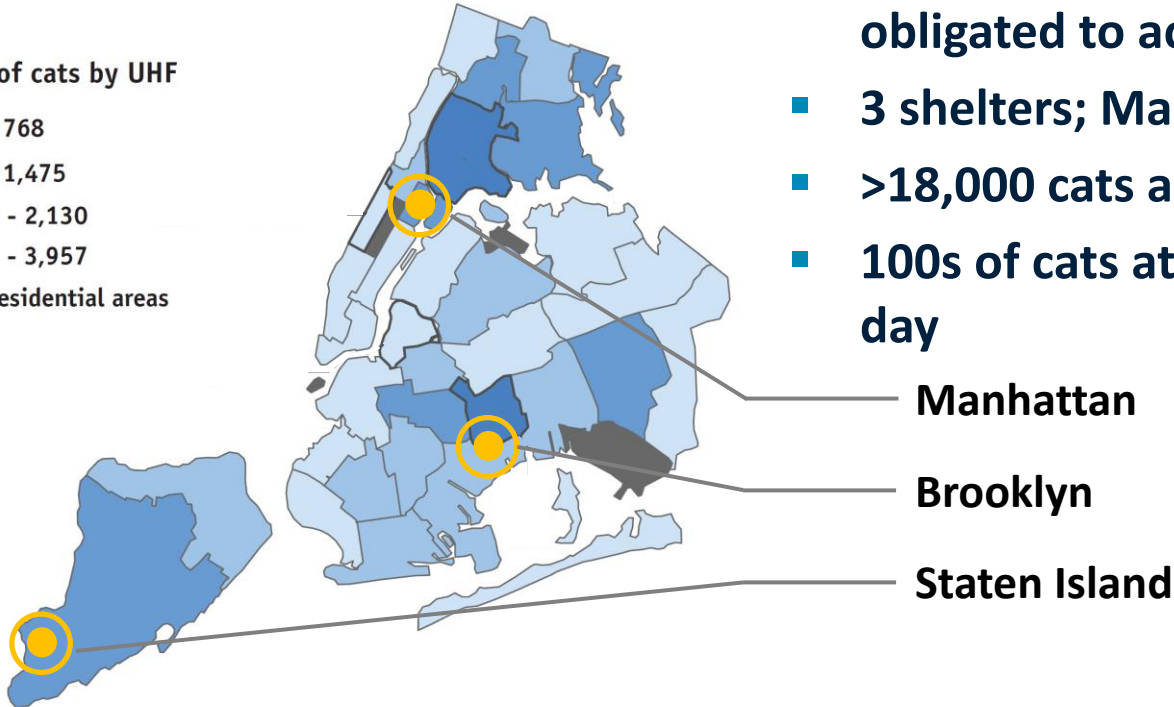
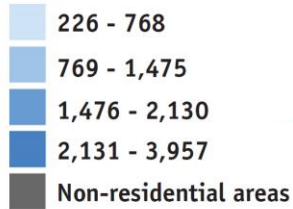
Influenza A(H7N2) Outbreak at Manhattan Shelter

- After the initial call, NYC DOHMH learned that >100 cats at the Manhattan shelter were infected with influenza A(H7N2)
- Testing performed by University of Wisconsin
 - High attack rate (>80% of cats tested)
 - Most cats that tested positive became symptomatic
 - Other animals at the shelter (chickens, dogs, rabbits) tested and were negative for influenza A(H7N2)

New York City Animal Care Centers (ACC)

Number of cats that New York City Animal Care Centers received, by UHF neighborhood, 2012-2013

Number of cats by UHF



- Operated by New York City and obligated to accept all animals
- 3 shelters; Manhattan the largest
- >18,000 cats accepted annually
- 100s of cats at each shelter each day

Cat Population in NYC

- Population-based household telephone survey in NYC in 2013 indicates 576,000 domiciled cats in New York City
- >10% of NYC households own cats
- Cats are companion animals, owners have close contact with cats and often their respiratory secretions



Live Poultry Markets in NYC



- > 90 markets in NYC
- Tested for avian influenza on monthly basis
- Full inspection quarterly

More About Index Cat A (aka Mimi)

- November 12 enters shelter
- November 14 develops ocular symptoms
- November 23 develops breathing problems
- November 25 precipitous decline in health
- November 26 humanely euthanized and found to have necrotizing pneumonia
- Canine panel erroneously sent
- December 1 preliminary result H3N2 (canine) influenza
- Sent to University of Wisconsin then USDA NVSL for confirmation
- December 14 NYC DOHMH notified when H7N2 (avian) identified

Likely Cat Zero - “Arthur”

- Several weeks later, learned of a cat that was ill earlier than November 12
- Tested positive for influenza A at private vet office
- Enters shelter October 26
- Develops illness on November 4 and dies November 12
- Subsequently confirmed several weeks later as H7N2

Tiny kitty named Alfred is patient zero in bird-flu outbreak

By Gabrielle Barkho

January 12, 2017 | 11:55pm



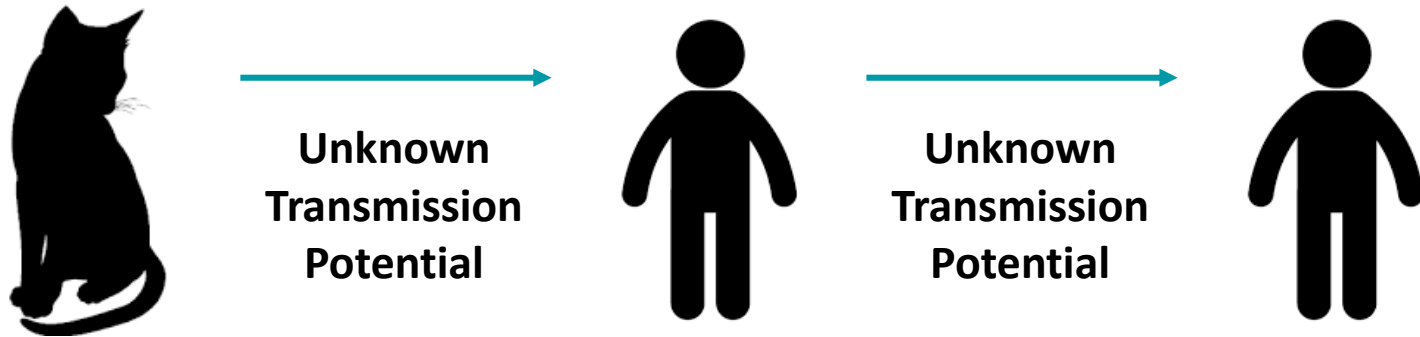
Alfred

Symptoms Among Infected Cats

- Attack rate ~80%, although not all cats symptomatic at the time of testing
- Almost all cats that tested positive ultimately became symptomatic:
 - Dry cough
 - Eye discharge, squinting
 - Nasal discharge
 - Sneezing
 - Lick smacking/licking

Concern for Pandemic Potential

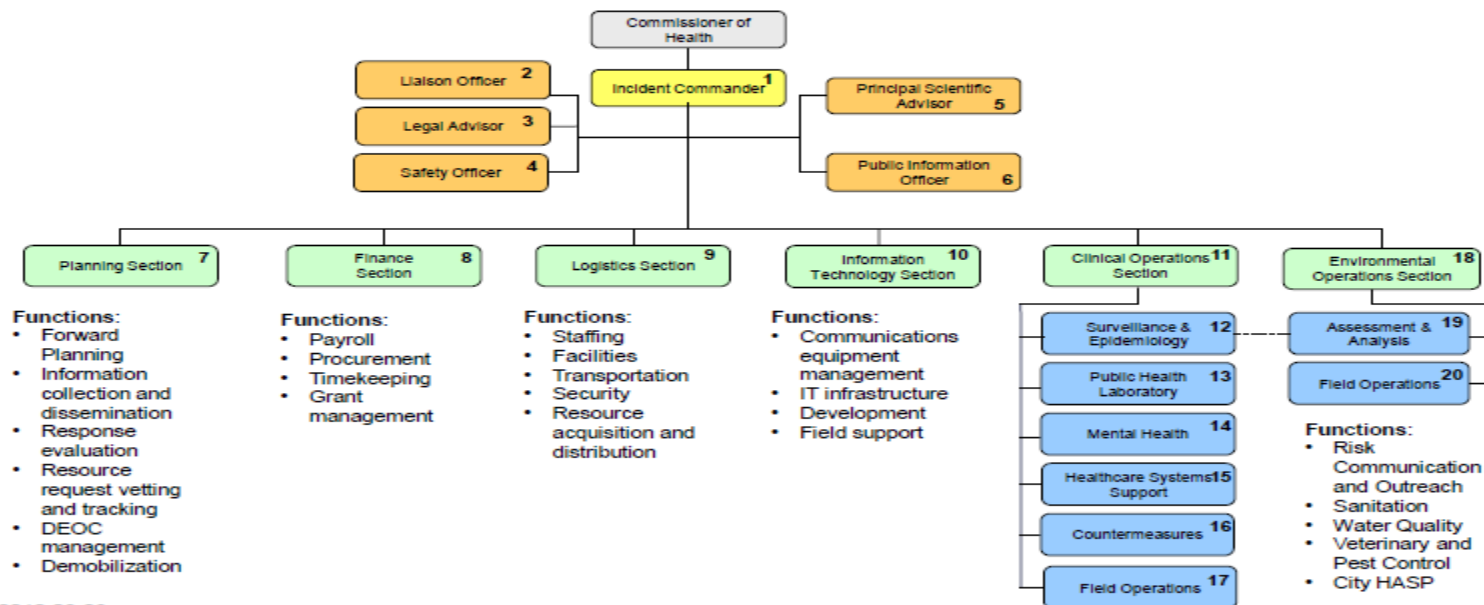
- Re-emergence of influenza A(H7N2) in a new species
- First widespread transmission among mammals



DOHMH Public Health Incident Command System

NYC DOHMH Incident Command System

Numbers correspond to a description found on the back of this page



Activation of Incident Command System (ICS)

1. Establish whether cat-to-human transmission of influenza A(H7N2) occurred
2. Limit further exposure of cats and humans to influenza A(H7N2)
3. Interrupt transmission at shelters and re-establish programs for cat intake and adoptions

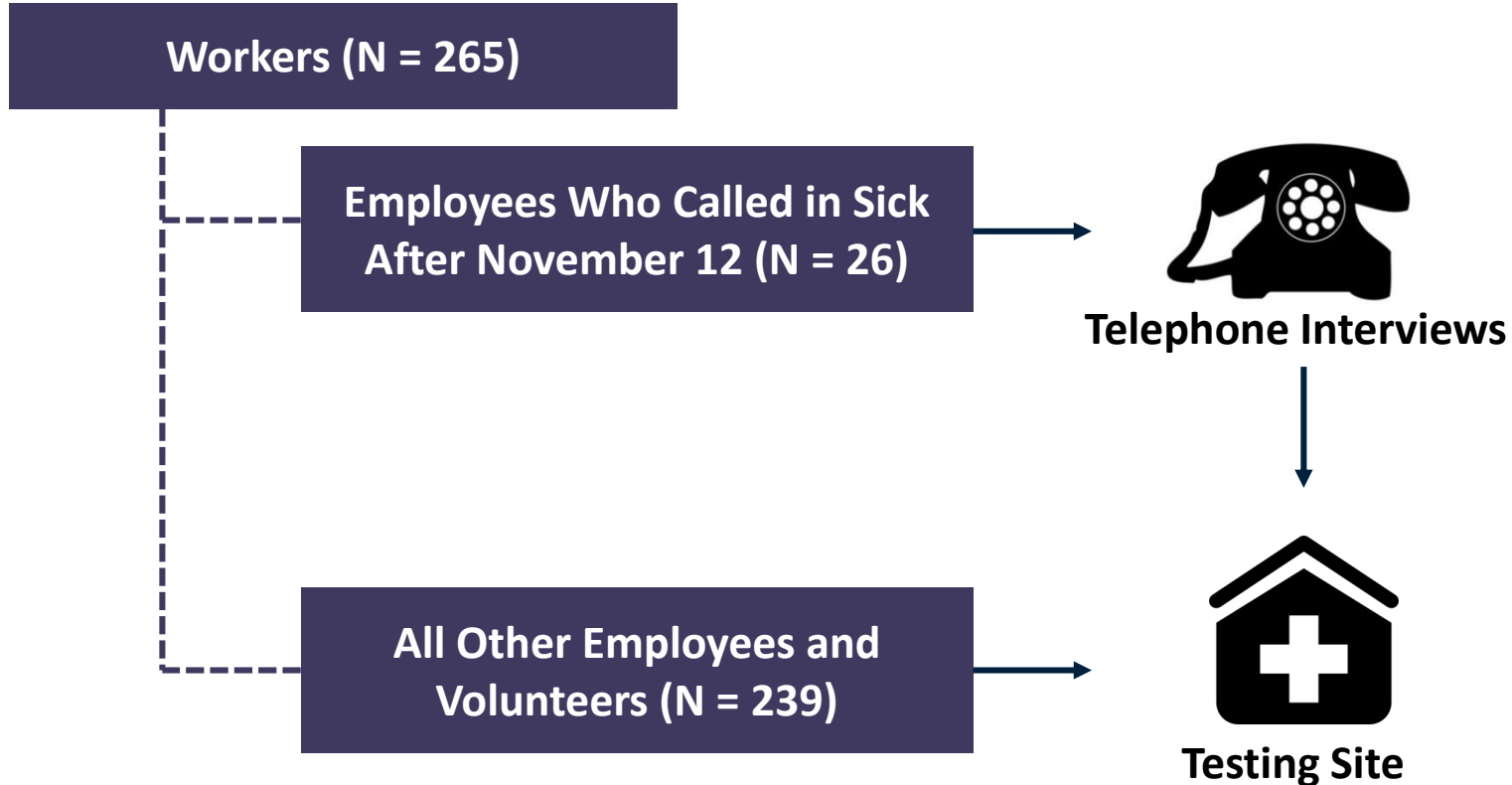
Active Case Finding to Identify Cat-to-Human Transmission

- Population exposed after November 12, 2016
 - Adopters of cats from Manhattan shelter
 - Workers (employees and volunteers) at Manhattan shelter
- Case definition:
 - Conjunctivitis or ≥ 2 of sore throat, muscle aches, fever, or cough
 - ≤ 10 days after exposure to shelter cat

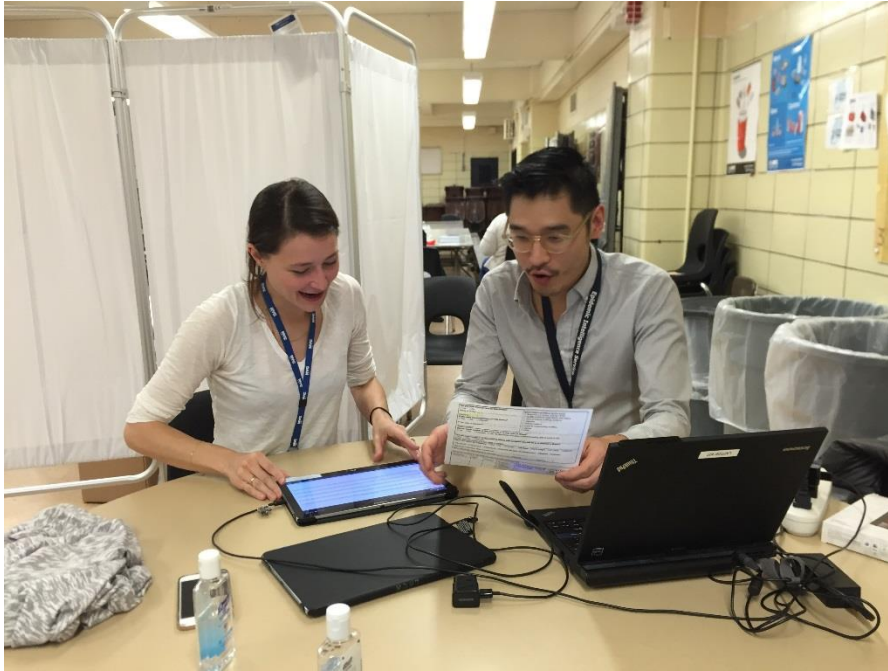
Case Finding to Identify Cat-to-Human Transmission

- Nasopharyngeal specimens tested for influenza A RNA by RT-PCR at NYC Public Health Laboratory using primer, probes, and protocols from CDC
- Laboratory testing particularly important given circulation of seasonal influenza in NYC during the surveillance period
 - Increase in seasonal influenza laboratory positive cases beginning epidemiologic week 48 (week ending December 3)
 - Influenza A(H3) > influenza B

Case Finding Strategy



Emergency Interview and Testing Site for Workers



Interviewed

**Osetamivir Provided if
Case Definition Met**

NP Specimen Collected

**Seasonal Flu Vaccine for
Unvaccinated Persons**

No Cases Found Among Workers (N = 265)

165 Workers Attended Emergency Testing Site (62%)

24 Met Case Definition

- 1 Tested Positive for seasonal influenza A(H3)
- No additional cases identified by enhanced passive surveillance
 - Flyers posted in building
 - ACC leadership actively informs staff to notify DOH if ill
- However, earlier infections could have been missed

No Cases Found Among Adopters (N = 385)

188 Interviewed Adopters by Telephone (49%)

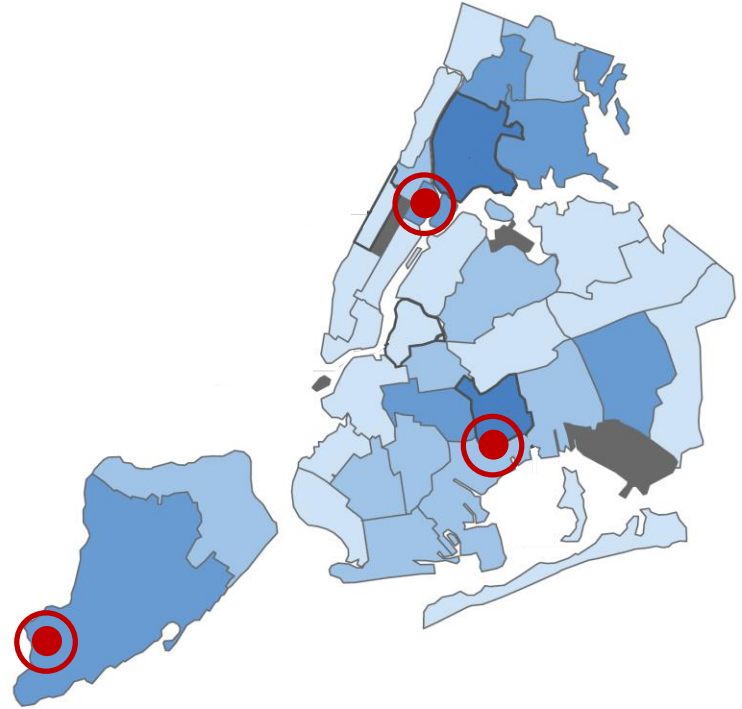
10 Met Case Definition

3 Referred for Testing and Tested Negative for Influenza A

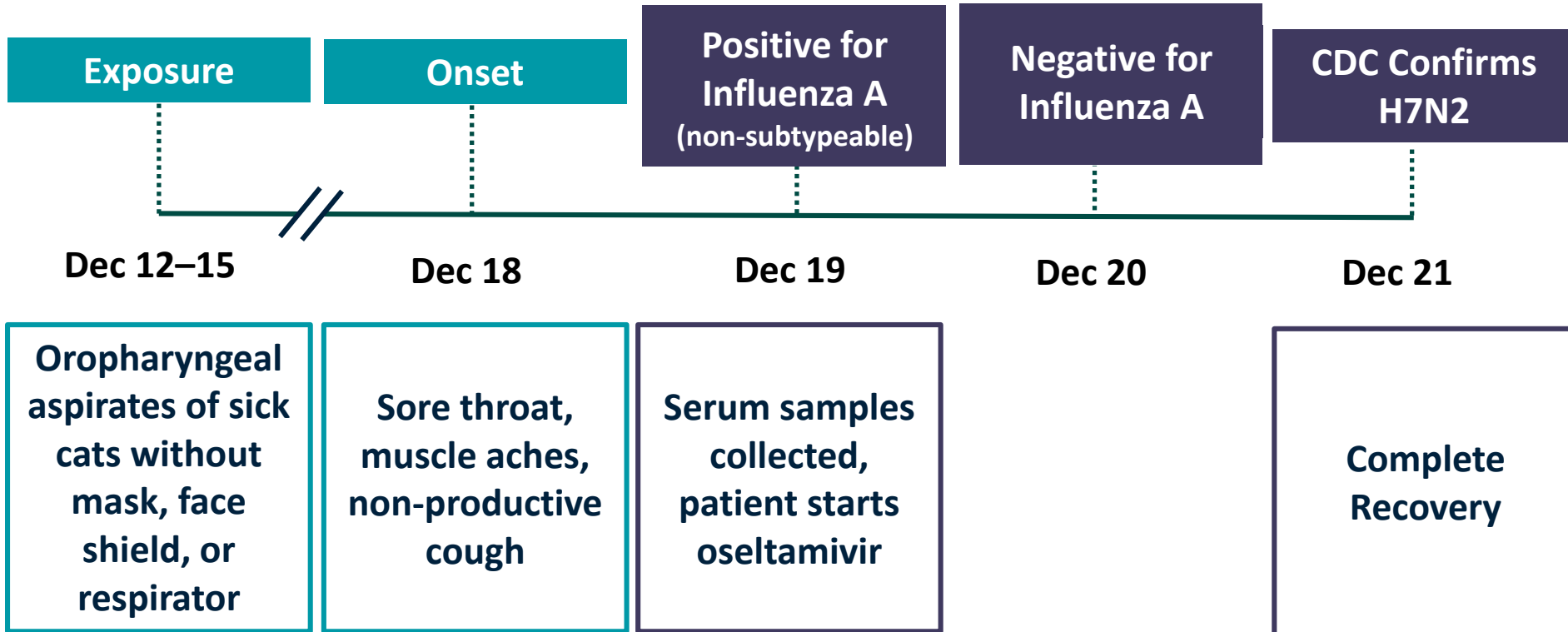


Meanwhile...

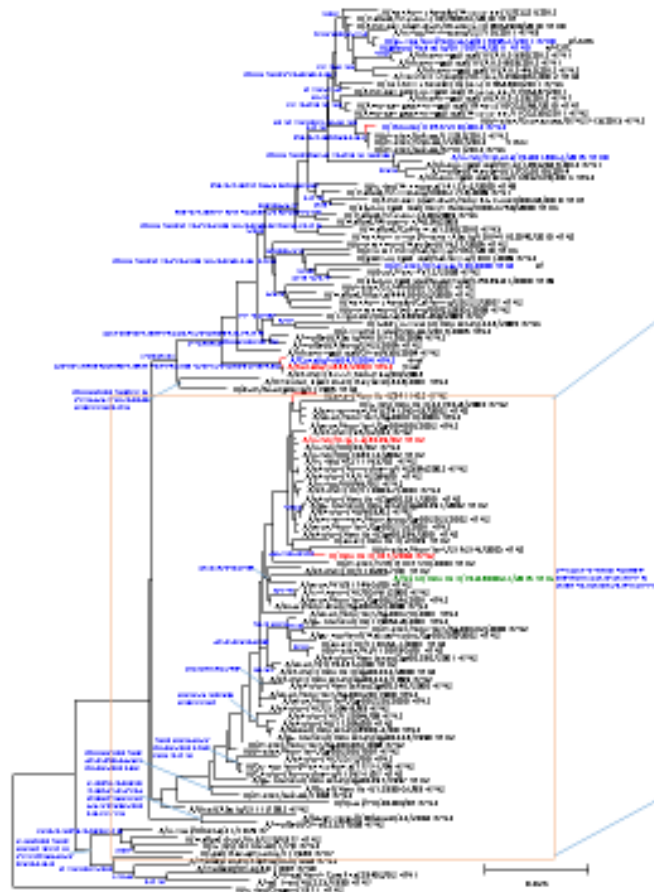
- Specimens from cats collected at Brooklyn and Staten Island ACC locations on December 15 tested positive for influenza A(H7N2)
 - 41 additional adopters from Staten Island and Brooklyn interviewed
 - 3 met case definition (7%), 1 tested and negative
- Enhanced passive surveillance to identify ILI in workers



Human Infection in a Veterinarian



Characteristics of influenza A(H7N2) viruses



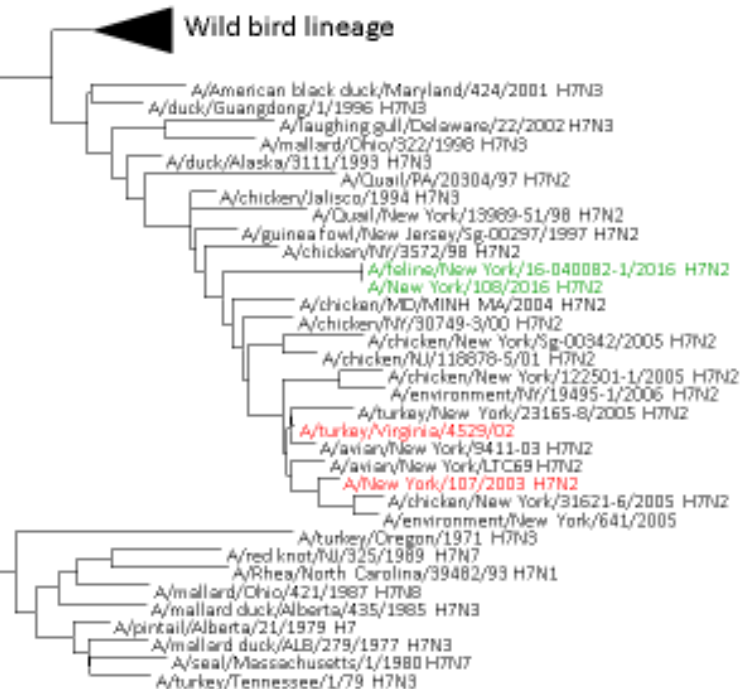
Evolution of influenza A(H7) HA in North America

Feline virus 2016

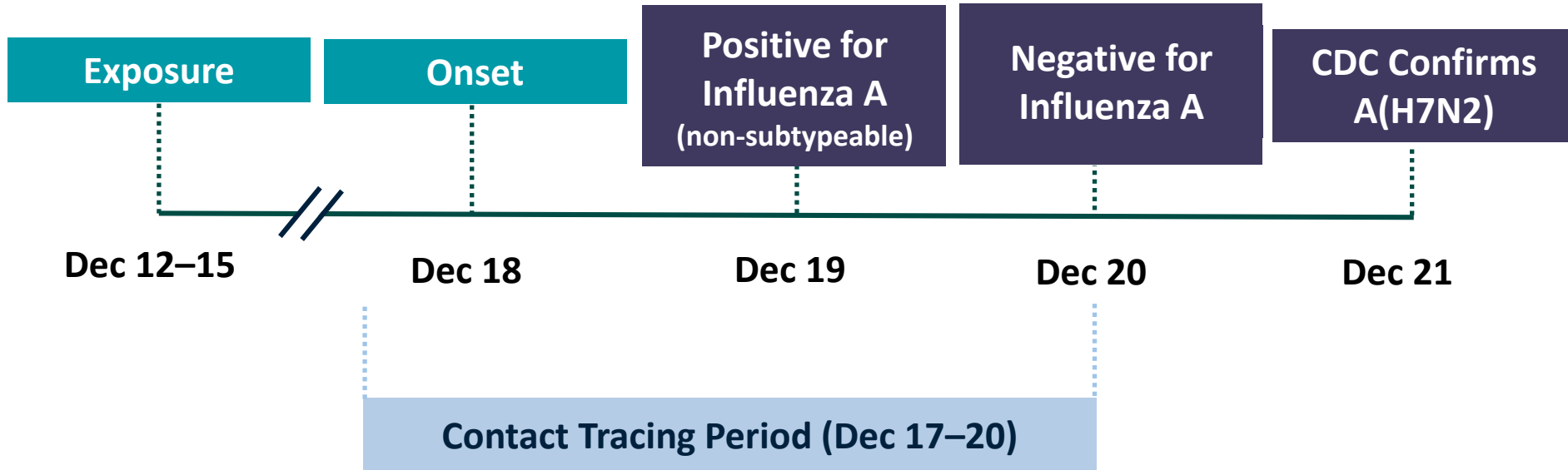
Reassortant vaccine candidate in red

CDC H1 reference viruses in blue

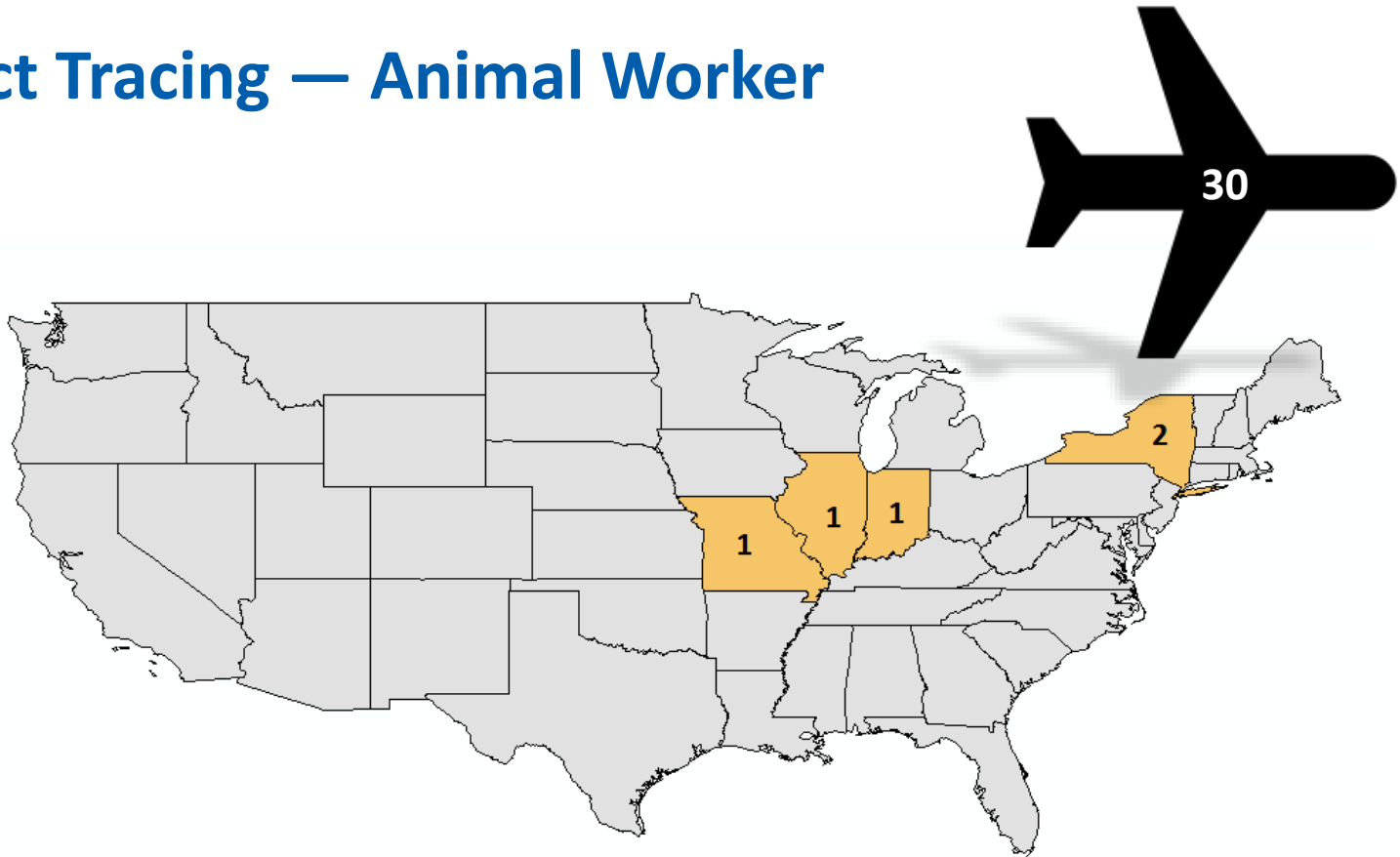
Amino acid differences relative to A/turkey/Virginia/4529/02 H7N2



Identifying Close Contacts of the Human H7N2 Case Patient



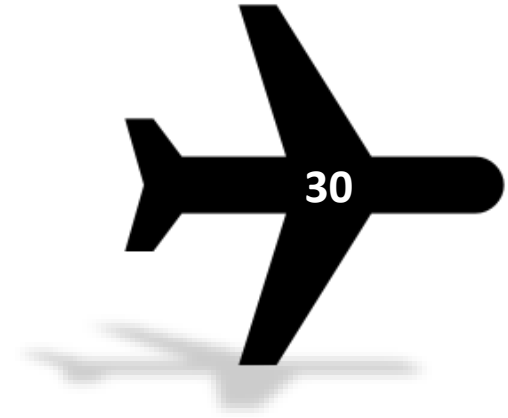
Contact Tracing — Animal Worker



- No contacts reported symptoms ≤ 10 days of exposure to patient

Contact Tracing — Veterinarian

- **Contacts assigned to health departments for interviews (n = 28)**
 - 20 contacted and interviewed (5 in NYC)
 - None with influenza-like illness



Public Health Actions

- Beginning December 15, ceased movement of cats between shelters and new adoptions ceased
- New York City DOHMH trained shelter staff on the use of gowns, gloves, shoe covers, and face shields for persons handling cats
- In addition, recommended N95 respirators with fit testing for persons collecting respiratory specimens



Quarantine Facility

- On December 29, ASPCA established a temporary, biosecure quarantine facility for over 500 cats
- Volunteers from >30 states, some developed influenza-like illness, but none tested positive for influenza A(H7N2)
- Facility closed March 14 (last new positive cat Feb 5)



Ongoing Surveillance — Laboratory

- **Laboratory surveillance for non-subtypeable influenza A-positive specimens from NYC hospitals**
 - **Facilities using Biofire FilmArray®**
 - **Influenza A-positive, not subtyped as H1 or H3**
 - **Sent to NYC Public Health Laboratory**
 - **Of 7 specimens tested as of August 2017, all H3**

Ongoing Surveillance — Serosurveys

- Serosurvey of ACC Employees and Volunteers
 - January–February 2017
 - Epi-Aid investigation to identify additional infections (including subclinical) using convalescent serum specimens



Rescue Groups Sent ACC Cats to Other States

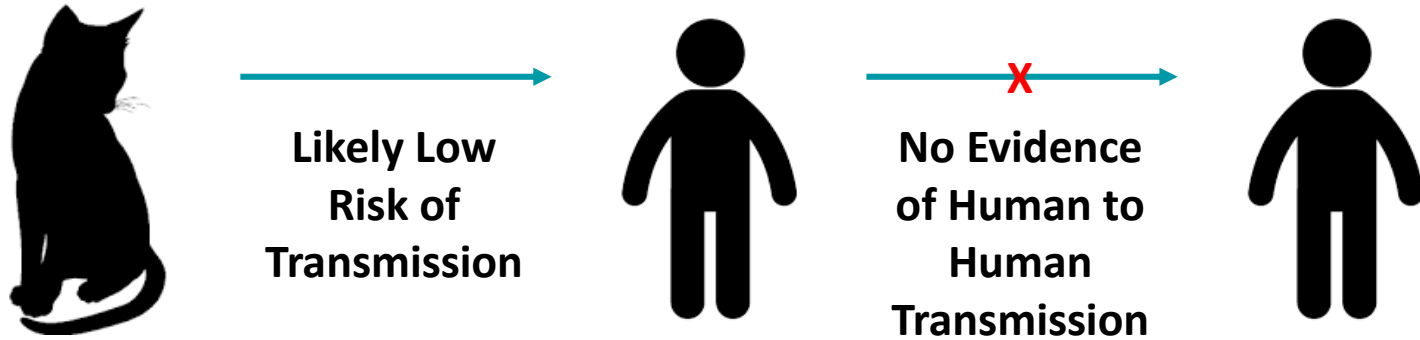
- Prior to outbreak recognition, 332 cats who were at ACC on November 12th or later, were accepted by rescue groups, who facilitated the transfer of cats to 5 other states for adoption (CT, ME, NJ, NY, PA)
- We contacted the departments of health and agriculture of these states
 - Provided contact information of the rescue groups
 - Provided guidance and protocols if an adopter reports influenza-like illness
- No human cases of influenza A(H7N2) identified

A teal-colored circle containing the text "Notify Other States".

Notify
Other
States

Summary: Low Risk of Transmission of Influenza A(H7N2)

- First outbreak of A(H7N2) among cats
- First cat-to-human transmission of any influenza A virus in vet with prolonged and unprotected exposure to respiratory secretions of ill cats



Limitations

- Additional human infections may have been missed since case finding started > one month after index cat entered ACC shelter
- Unknown whether H7N2 was circulating among cats or other species in NYC prior to this outbreak
 - Cats are not normally tested for influenza

ICS Response Activities

- Highlights benefit of activation of an incident command system to accomplish multiple goals by rapidly mobilizing 100s of NYC DOH staff (especially the week before December holidays)



**Case Finding
and
Surveillance**

**Notifying
Other
States**

**Infection
Prevention**

**Quarantine
of Sick Cats**

Importance of One Health Approach to Emerging Zoonotic Infections

- Surveillance of emerging infections among animals
- Collaboration between animal and human health specialists
- Inter-agency collaboration was critical to outbreak response
 - USDA and state agriculture departments
 - ACC and ASPCA
 - Academic and public health laboratories
 - CDC and multiple state health departments

Thank You



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- Robin Brennan



- Todd Johnson



Photo Credit: New York Times